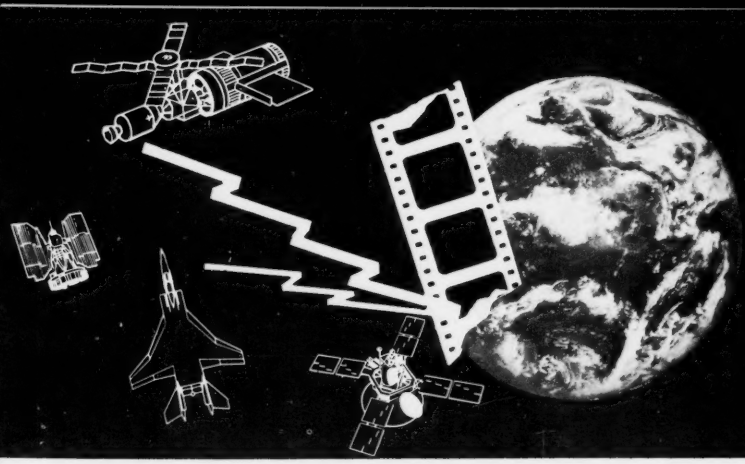

NASA ACTIVITIES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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LETTER FROM WASHINGTON

June 3, 1974

Dear Colleagues:

Next month we will observe the fifth anniversary of the day the first man from Earth landed on the Moon.

The 20th of July, 1969, will forever bear special meaning for the men and women of NASA, for the American nation, and for the human race.

For NASA people it was a day of truth after eight years of striving toward a goal that demanded unprecedented technological and managerial achievements. For American democracy it was a day of vindication —and a day to rededicate American strength in space to serve mankind. For the human race it was the day of the giant leap forward, **the day the Moon became a stepping stone,** the day we moved up to a new level on the scale of evolution.

This day, July 20, will always be important in history; nothing can change that. But I hope that it can continue to be much more than just a date to remember. I hope that the achievements of the Apollo era will continue to live in NASA traditions, and in NASA attitudes, and in NASA's ways of responding to challenge and getting the job done right.

I came to NASA nearly two years after the first Apollo landing on the Moon, but even that late I have observed the strength and inspiration

COVER

One of the first pictures received from the Synchronous Meteorological Satellite (SMS–1) shows North, Central and South America, with Central America approximately at the photo's center.

at NASA drawn from the Apollo spirit. I consider this spirit, even after five years, a significant factor in the daily work and the high aspirations of this agency.

I wish I could feel as certain that our country as a whole will remain imbued with, and inspired by, the spirit that made Apollo possible. Only time will tell about that. I think it is quite likely that the significance of July 20, 1969, will be better recognized and more eloquently memorialized in the year 2469 than it is today.

In the meanwhile, let us continue to apply the spirit of Apollo, and the practical lessons of Apollo, to the work at hand. And let us remember that the future giant leaps of mankind are being made possible by the many small steps that we take each day as individuals and as members of various NASA teams.

It is surprising how far we have already come in the first five years since we reached the Moon.

There have been, of course, five more Apollo landings on the Moon, including the Apollo 15, 16 and 17 missions which were in reality part of a New Apollo Program because of their concentration on scientific exploration on the Moon rather than the technology for getting there and back.

There has been the heroic voyage of Apollo 13, and all that it taught us about handling space emergencies and replanning complex missions in "real time" over vast distances.

Then there have been the many advances made in Skylab, and in the Earth Resources and other applications programs, which in my opinion add up to another giant leap for mankind in our ability to use Near Earth Space for science and practical benefits.

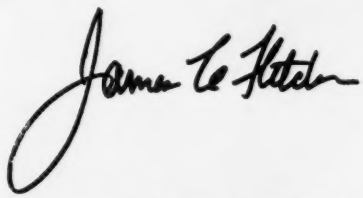
There have also been the magnificent voyages of exploration made or being made by Mariners 9 and 10 and Pioneers 10 and 11. Already they have produced exciting advances in our understanding of the Solar System and how the planets evolved; and they have given us invaluable information about the planet of greatest concern to us, Planet Earth, and about its future.

Moreover, in the Viking program we are now taking long steps forward in the technology of planetary exploration. The compact laboratories we expect to land on Mars in 1976 may well discover evidence of life there and thus have a greater impact on the thinking of mankind and the future of space travel than anything we have done so far.

We can take great satisfaction, too, in mid-1974, from the looming fact that in another five years we will have entered the new era of intensive space use made possible by the Space Shuttle and the Spacelab. These are advanced new Space Age tools that build upon the technology created in Apollo, but add tremendous new capabilities of their own. (The first flight of the Space Shuttle in Earth orbit is now scheduled for the second quarter of 1979; and the first use of the manned Spacelab aboard the Space Shuttle is now scheduled for 1980.)

We can all be proud, on this anniversary, of our new space programs that will keep alive the traditions of Apollo and gain new benefits for our country and mankind far beyond those in sight when the Apollo goals were set or even when men first landed on the Moon a scant five years ago.

Sincerely,



JAMES C. FLETCHER
Administrator

July 20, 1969—"the day the Moon became a stepping stone."

NASA'S LARGEST CASH AWARD IS PRESENTED DR. WHITCOMB

Langley Engineer Receives $25,000 for His Invention of Supercritical Wing

Dr. Richard T. Whitcomb, Head of the Eight-Foot Tunnels Branch of the High-Speed Aircraft Division at Langley Research Center and one of the nation's most distinguished aeronautical engineers, received a $25,000 cash award from NASA on May 20 for his invention of the supercritical wing.

Made possible under the Space Act of 1958, the award is the largest ever made by NASA in cash to an individual.

The supercritical wing, an improved airfoil

Dr. Richard T. Whitcomb

design, will permit significant increases in the speed and range of subsonic jet aircraft without increased power or fuel consumption. It is expected to have wide application, particularly for commercial aircraft.

The award was made by Dr. James C. Fletcher, NASA Administrator, at a ceremony in Washington. Among those present was Edgar C. Cortright, Director of the Langley Center.

This award is the latest in a long list of honors received by the 53-year-old Dr. Whitcomb during his 31-year career with NASA and its predecessor organization, the National Advisory Committee for Aeronautics (NACA). Last October, at the White House, President Nixon presented him the National Medal of Science, the Federal Government's highest award for distinguished achievement.

Dr. Whitcomb received the Collier Trophy in 1954 for that year's "greatest achievement in aviation in America," application of the so-called area rule to the design of supersonic aircraft. His other awards include the Exceptional Service Medal of the U.S. Air Force, highest civilian award of that agency; the first Distinguished Service Medal to be awarded by NACA; the NASA Medal for Exceptional Scientific Achievement; and the Sylvanus Albert Reed Award of the American Institute of Aeronautics and Astronautics.

The latest award was made on the recommendation of the NASA Inventions and Contributions Board. It is one of a series of major awards under consideration by the Board to recognize important contributions by NASA and contractor employees to the agency's space and aeronautics program.

Dr. Whitcomb joined the staff of the Langley Research Center in 1943. Fifteen years later, he was appointed Head of the Eight-Foot Tunnels Branch of LaRC's High-Speed Aircraft Division, supervising development of various means for improving aerodynamic performance of aircraft at transonic speeds.

WINTER SUCCEEDS BERRY

Dr. David L. Winter, formerly Deputy Director of the Ames Research Center Life Sciences Directorate, has been appointed Director for Life Sciences at NASA Headquarters, to succeed Dr. Charles A. Berry, who recently retired from NASA.

In his new post, Dr. Winter will be responsible for the management of life sciences programs in the Office of Manned Space Flight. He also will have the responsibility of directing the total Life Sciences Program, which encompasses life science applications, aeronautical life sciences, research into the question of extraterrestrial life, and occupational medicine.

A native of New York City, Dr. Winter was graduated from Washington University Medical School at St. Louis, MO. After a surgical internship at Barnes Hospital in that city, he was a Neurosurgical Resident and later a Teaching Fellow in Physiology at Baylor University School of Medicine. In 1962, he became a Research Medical Officer for the U.S. Public Health Service at the National Institute of Neurological Diseases and Blindness in Bethesda, MD, and was with the Walter Reed Institute from 1963 until he joined NASA in 1971.

FLETCHER WRITES ON FUTURE OPTIONS OF SPACE PROGRAMS

Points Out Great Value of High Technology To Overall Economy of Nation

"NASA's Aerospace Programs: Options for the Future" is the title of an article by Dr. James E. Fletcher, NASA Administrator, in the spring issue of STRATEGIC REVIEW, quarterly publication of the United States Strategic Institute, Washington, DC.

The article points out that leadership in high technology can be sustained only with aggressive commitment of talent and resources. It recalls that the field of technology has been one of intense activity, especially during the last 25 years, and has been highly rewarding to the nation, a fact Dr. Fletcher says too often seems to be overlooked.

"From 1948 to the end of 1973," he states, "America has manufactured and sold aerospace products valued at more than $440 billion to the domestic and foreign markets. Nearly $45 billion of this was in exports. U.S. industry has been a major contributor to national defense, the economy, and jobs for Americans. The potential ahead could be even greater."

In his treatment of the topic, Dr. Fletcher reviews the Skylab program, ERTS program, Space Shuttle, exploration of the outer planets, Viking, Mariner 10 Venus-Mercury probe, future missions, and aeronautics. This is what he wrote about Skylab:

"Like the Shuttle, Skylab is a key program in developing the resources and usefulness of space for man. The technology, the scientific data and the flight experience obtained can be decisive factors in future national policies and programs aimed at improving life on Earth.

"Skylab's fields of investigation range from astronomy and solar studies to Earth observations, from life sciences experiments to space physics, and from medical to materials research and product manufacture. Other experiments are aimed at laying the groundwork for more permanent stations of the future by improving structures and equipment for space operations, designing more habitable stations, and learning the techniques of living and working in a weightless environment.

Experiences Encouraging

"Our experiences with Skylab have been greatly encouraging, despite initial setbacks. The performance of the astronauts and ground personnel in NASA, industry, and universities in retrieving the vehicle and the mission from a critical condition is something we can all proudly acclaim. When the meteoroid shield tore away at launch, damaging the main solar array panels, and resulted in high interior temperatures due to solar radiation, we might have despaired and written off Skylab as so much space junk.

"However, that was unthinkable. What the ground teams and astronauts did in saving the project, moreover, proved the crucial value of man in space, if only to meet equipment emergencies. They reaffirmed the American talent for meeting emergencies and overcoming them in the face of great odds. They further demonstrated that superb training, ingenuity, and resourcefulness rise to meet the problem during times of stark need. Skylab made us relearn a lesson history has often repeated.

"We have since had further demonstrations of man's value, particularly in solar observations with the Apollo Telescope Mount (ATM). During the Skylab 2 mission, a moderately strong flare was initially detected by automatic instruments. The astronaut on duty immediately directed the telescope mount toward the flare and switched it to a higher observational frequency. He recorded what we understand was the rise phase of a flare for the first time from a space platform.

"Subsequently, magnetic spectrum observations have been increased a hundred times over those previously readily obtainable. This was due not only to the performance of the ATM but also to the astronauts' ability to operate it. Astronomers were especially impressed also when Charles "Pete" Conrad was the first man to go out and repair an optical surface while in orbit. He removed a bit of lint from the SO-52 coronagraph occulting disk, thereby preventing a significant degradation of subsequent data when coronal forms appeared in that region of the instrument. I am told it is a delicate operation to perform even on a laboratory bench. But Conrad did it successfully in space.

Previous Theory Outdated

"The ATM's seven major solar-oriented instruments have provided a wealth of superb data. It would appear that previous coronal theory will have to be discarded as a result. It is much more dynamic and not so homogeneous as expected. One

of the findings in corona observations may have a near-term practical benefit in weather forecasting.

"It was recently discovered that, when the boundary between magnetic fields in the interplanetary medium sweeps by Earth, there is a rather profound effect on our weather. ATM solar observations are able to pinpoint the position of these field boundaries when they intersect the Sun's corona. This could lead to a means of predicting when these magnetic fields will flow past Earth, thus aiding long-range weather forecasting. The interesting point is that, when the interplanetary magnetic boundary passes near the Earth, it generally correlates with an approximate 10 per cent reduction in large storms in the Northern Hemisphere.

"We are now trying to find out whether this is a highly local effect. If it is, scientists may well be able to say that certain areas of the Earth will have very stable weather whenever a magnetic sector boundary passes by.

"An important Skylab activity was the Earth Resources Experiment Package (EREP). All data recorded on board was by means of systems operated by the astronauts in a coordinated program involving the Earth Resources Technology Satellite (ERTS) program, associated aircraft, and ground crews.

"We had two major objectives in the EREP experiments. First, we wanted to get information for use in designing future operational Earth resource missions. The Skylab instruments complemented those used in the Earth Resources Technology Satellite launched in July, 1972, by providing higher spatial resolution, multiple bands over an extended spectral range, and microwave coverage over selected surface areas. In contrast, ERTS obtains lower resolution over a limited spectral range but which is repetitive over most of the Earth.

"From both Skylab and ERTS data, we can determine the best instruments and techniques to be used for operational Earth resources missions in the coming years.

Much Data Gathered

"The second general objective was to gather data for specific studies by investigators around the world. Tens of thousands of photographs and many miles of magnetic tape are being analyzed by the 141 principal investigators involved. Analysis of this mass of data will require several years, but some initial results can be described.

"One of these may be significant in terms of mineral resources, of which the United States consumes about 30 per cent of the total world production. One of the principal investigators believes that Skylab imagery has revealed a vast concentration of ores in Nevada. Called an 'elephant ore' deposit, he was able to pinpoint it from volcanic outcroppings which suggest that the mineral-bearing layer is near the surface. In addition, partial information on potential geothermal energy sources in the western U.S. and Mexico was gathered by Skylab.

"The microwave systems flown on Skylab are the first in several respects: the first active systems flown in space; the first U.S. measurements by an L-band radiometer operating at 21 centimeters or 1.4 gigaHertz; and the first U.S. altimeter measurements from Earth orbit. These systems have been used to acquire data for a variety of sea states including the fiercest North Atlantic storm recorded in over a decade. Hurricane Ava also was measured in the Pacific, together with data on snow, sea and lake ice, and freeze/thaw lines in certain surface regions. The measurements obtained with these systems are significant both in terms of the verification of potential applications and in identification of design features for future systems.

"The EREP altimeter gave us the first direct measurement of the ocean trough over the region of the Puerto Rico Trench, site of the Atlantic's deepest point of 27,500 feet. Early analysis of the data indicates the depression of the sea may be about 20 meters, or 66 feet. Measurements over other areas show minute changes—as small as half a meter. These variations in surface levels are caused by gravity anomalies due to the topography of the ocean bottom, such as the Puerto Rico Trench. Others, of course, should exist in the Pacific and elsewhere.

"In summary, data provided by EREP are demonstrating the varied capabilities of remote sensing from space of which only a few examples have been given here. The data also provide a basis for defining sensor characteristics for future space systems.

Materials Processing Area

"Another major area of Skylab experiments is materials processing. From these experiments we are gaining new knowledge about the properties of materials and ways of using them both on Earth and in space.

"Where material processing is concerned, the main difference between Earth and space is that in a freely flying spacecraft the effective force of gravity is reduced to zero. Under this condition, it becomes possible to exert very precise control over some processes, and others behave in new ways, because the force that causes thermal convection, buoyancy, sedimentation, and other disturbing effects is removed.

"One series of experiments concerned welding and brazing methods for the assembly of structures in space. It was demonstrated that both joining methods can be used reliably in the space environment and are easier to use in some respects in space than on Earth. In the brazing experiment, nickel and stainless steel tubes were brazed to couplings using chemical heat sources to melt performed silver-copper braze alloys in the joints. It was found that perfect joints could be formed with much larger joint clearances than are practical on Earth, and that voids and porosity were eliminated from the braze material.

"Among the first things that might be built in space using such methods is a reflector for microwave energy. Large amounts of energy might be transmitted from one point on Earth to another by beaming microwaves to an orbiting reflector and down again to the site where the energy is needed. This would eliminate the need of transmitting energy by cable or by fuel tank cars or other surface means. A further advantage would be that power-generating sources can be located in remote areas instead of close to cities.

"A reflector of this kind would have to be about a half mile square and assembled in space since we could not launch it in one piece. Using the Space Shuttle/Tug, units of the reflector could be placed in the desired geostationary orbit and joined together. The welding and brazing experiments have made us confident that the joining of such metal structures can be done.

Effect of Weightlessness

"In Skylab's biomedical experiments, the long duration physiological effects of weightlessness on the crews are among the most important factors affecting the future of manned space flight, both in prolonged orbital periods and planetary exploration missions. So far, no specific effects have been revealed which set an upper limit on human exposure to weightlessness.

"Analysis of blood samples taken in space showed two unusual findings. One was that, although the white blood cell count did not decline, there was reduced immunology. In other words, the leucocytes seemed to lack vigor in attacking bacteria or foreign bodies.

"The other finding was that there was a slight decline in the volume of blood plasma. At the same time, there was an increase in aldosterone, a hormone produced by the adrenal glands, and this seems to be connected with the reduction in the plasma. It is thought that the extra aldosterone helps to maintain fluid balance of the blood.

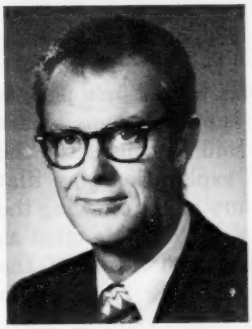
"Results have verified the usefulness of motion sickness medication to promote rapid crew adaptation to zero gravity in large volume spacecraft. After an initial period of adaptation to weightlessness, the crews have shown a marked increase in tolerance to motions in orbit which increase in tolerance to motions in orbit which on Earth would induce motion sickness. The doctors say this observation is important to the improved understanding of human physiology here on the ground as well as in space.

"In addition to the vestibular system and blood, we have gathered the data necessary to evaluate in detail the effects of the space environment on each of the body's major subsystems."

YARDLEY SUCCEEDS MYERS

John Finley Yardley, Vice President and General Manager of the Eastern Division, Astronautics, for the McDonnell Douglas Corp., has been named Associate Administrator for Manned Space Flight to succeed Dale Myers, who recently returned to private industry.

In his new capacity, Yardley will direct NASA's manned flight programs, including Space Shuttle, the Apollo-Soyuz Test Project, and the U.S. responsibilities in Spacelab.



John Finley Yardley

A native of St. Louis, he received a BS degree in Aeronautical Engineering from Iowa State College and an MS degree from Washington University. After three years in the Navy during World War II, he joined McDonnell Douglas in 1946 as a Structural Engineer. From 1958 to 1960, he served as Project Engineer for Mercury Spacecraft Design. From 1960 to 1964, he was Launch Operations Manager for the Mercury

and Gemini spacecraft, and then served for the next three years as Gemini Technical Director. He was also Vice President and corporate-wide General Manager for the Skylab project before being named Vice President and Deputy General Manager of the Eastern Division.

He received NASA's Public Service Award for Mercury in 1963 and for Gemini in 1966. A Fellow of the American Institute of Aeronautics and Astronautics, he was awarded the Spirit of St. Louis Medal by the American Society of Mechanical Engineers.

DR. NAUGLE PREDICTS LIFE WILL BE MOVED TO PLANETS

Sees Experiment Depending on What Is Found On Mars

"I am sure life will move out from the Earth, probably first to the Moon and then to Mars," Dr. John E. Naugle, Deputy Associate Administrator of NASA, recently said in reviewing the planetary program before the National Space Club in Washington.

Just what form of life will be transplanted to another planetary body—whether it will be man, with his attendant requirements for life support systems, or whether it will be some simple organisms which can live and thrive in the Martian environment and perhaps, by living, modify and make Mars more hospitable to man—will be the subject of considerable debate, he predicted.

He identified the effort to transfer life as "a really cosmic experiment" to be begun in case it is found that there is no life on Mars. As to when it will be attempted—in 1980 or in 19,080—he gave no estimate.

Recalling that mankind has visited four planets in the last four months—Jupiter, Venus, Mars and Mercury—Dr. Naugle said he considered the only comparable period of exploration was that which took place in the century or so following the discovery of the New World in 1492. He cited as the next major event in the exploration of the solar system the projected Viking landings on Mars in 1976, another step in the move to determine whether there is life on that planet.

Background of Program

To understand the evolution of the planetary program, he explained, one must go back to the summer of 1965, when two significant events occurred. One was a study conducted at Woods Hole in Massachusetts to examine where the space program should go after Apollo and the other was the flight of Mariner 4 past Mars.

Out of the study, he recalled, came a recommendation that planetary exploration should be a major goal of the space program for the next decade.

"We said we ought to try and understand the origin and evolution of the solar system, the origin of life, and the planetary processes that affect life on Earth," he continued. "There was a good deal of debate as to how to explore the planets; which planet should be visited first, and whether we should concentrate on one and, if so, which one. Would it be better to have a broad-based program to explore all the planets in the solar system? Should we use flybys or orbiters, and when and on what planets should we land?

"* * * We had some three centuries of telescopic observations of the planets behind us, so we knew a good deal. But there was also a good deal we thought we knew which turned out to be wrong."

Out of the Woods Hole debate emerged several factors which Dr. Naugle said are still valid a decade later and which have had a powerful influence on the program. First of all was a desire to know if there was life on any of the planets. Secondly, it was decided that priority should be given to the study of Mars, while also maintaining a wide-ranging program of general exploration of the solar system.

Priority Given Planets

Mars was given first priority, he revealed, because it most closely resembled the Earth and was most likely to harbor some form of life. The Moon was given second priority and Venus third, while the Outer Planets were fourth, comets and asteroids fifth, and little Mercury sixth.

"There was a great deal of concern among the physical scientists as to whether that was the proper priority," he recalled. "Perhaps Jupiter should be given priority. Two centuries of optical observations—and a decade of radio astronomy observations—had shown that Jupiter had a magnetosphere, a Great Red Spot, and generally appeared to be a most interesting planet. However, Jupiter was a long way away; it took light 45 minutes to get there. It would take a spacecraft almost a year to reach that planet."

Later in the decade, Dr. Naugle reported, it was realized that Jupiter, in addition to being a very interesting planet, was the gateway to the

Outer Planets and the Galaxy, so Pioneers 10 and 11 were sent to explore it and serve as trailblazers.

Going back to 1965, he said one of the principal scientific questions was the atmospheric pressure at the surface of Mars, which was believed to be about a tenth of that of the Earth. In July of that year, Mariner 4 reached Mars and sent back 21 pictures of the Martian surface. While they were not very good, they revealed that Mars was cratered and that the pressure at the surface was a little less than a hundredth of that of the Earth. This was verified by Mariners 6 and 7 in 1969.

"They sent back better pictures which showed more craters, a chaotic terrain and some very remarkable views of the south polar cap," he reported. "But there was no evidence of mountains or prehistoric oceans—nothing earthlike.

"The data verified what scientists had speculated upon after Mariner 4: that the polar caps were most likely from frozen carbon dioxide or dry ice. The scientists looked very diligently for chemical evidence of life in the atmosphere or on the surface, but found none. There did seem to be some evidence of a slight amount of water. The data also showed that the atmosphere was composed almost entirely of carbon dioxide, with no detectable nitrogen."

Viking Project Started

In the meantime, Dr. Naugle reminded, NASA started and then stopped an ambitious project called Voyager, estimated to cost about $2.5 billion. Instead, the emphasis was placed on Viking, at about a fifth of that cost.

"We had to walk a careful tightrope to put Viking together," he explained. "If we decided on too ambitious a program, we would not be able to obtain support. On the other hand, if we decided on too small a project which was not capable of succeeding, or which simply repeated measurements the Russians had already made, then we would have wasted a great many very talented scientific and technical man years. We will not know whether our judgment was correct until July, 1976, when we attempt to land on Mars."

Decision was also made to place a spacecraft with good cameras in orbit around Mars to search for a landing place. This was done in the fall of 1971, which he described as "the low mark in both scientific and public interest in Mars," and it arrived at the planet in the midst of a spectacular dust storm.

"We were still giving priority in the planetary program to Mars and the search for life on Mars," he said, "but some of us were beginning to question the wisdom of that Woods Hole study back in 1965, the subsequent recommendations of the Space Science Board and the Lunar and Planetary Missions Board, and our decision to give high priority to Mars."

Dust Storm Clears

But the dust storm cleared, and four spots that had been noticed despite the dust were found to be the largest volcanoes known to man. Moreover, Mars had a great rift valley running around its equator, there appeared to be features that looked like ancient stream beds, and there was a strange layered terrain in the polar regions. Calculations showed that there was probably enough water frozen under the polar cap which, if evaporated into the atmosphere, would match observations of water content in the atmosphere. In addition, the Russians in 1971 had found that Mars had a small but apparently intrinsic magnetic field.

"Suddenly," Dr. Naugle told the Space Club, "we had a new and exciting Mars on our hands. One could wish that he could return a million years from now and watch a time lapse movie of Mars as it evolves. We mapped the entire surface of Mars with Mariner 9, made a geological analysis of the surface and selected four landing sites for Viking. We also gave information to the Russians to select their landing sites for Mars 6 and 7."

Posing the question, "Where do we stand after almost a decade of Martian exploration?," he said:

"In retrospect, I think the decision to give priority to Mars has been sound. However, the other part of that decision—to have a broad-based effort to explore the solar system—has also been sound.

"Clearly, we know a great deal more about Mars, but we also know a great deal more about Venus, Mercury, and Jupiter. We know that Mars is an active planet."

Major Issues at Hand

He also posed questions as to the next step in the exploration of Mars after the scheduled Viking lands in the summer of 1976 and whether Mars continues to get first priority in the 1980s.

"These are some of the major issues facing

NASA in this summer of 1974," he said. "One year before launch and two years before we can have any data back from a Viking lander, we must face the question as to whether there should be follow-on Vikings."

He mentioned that Viking may preclude other exciting planetary missions, adding that NASA would like to send a pair of Mariners past Jupiter to Uranus in 1979, and also to orbit Jupiter and Venus, as well as Mercury.

"In a sense," he continued, "we find ourselves asking that same question we did a decade ago. Should Mars continue to have first priority in planetary exploration? If so, on what scale? Should we still continue a wide-ranging planetary program in the 1980s as we have in the 1970s? Clearly, if we find evidence of life on Mars there will be tremendous interest in studying that life, and there will be no question—Mars will have first priority."

YOUNG HEADS ASTRONAUTS

John W. Young, veteran of four manned space flights, has been named Acting Chief of the Astronaut Office of the Johnson Space Center Flight Operations Directorate. Alan B. Shepard, Jr., former head of the office, who recently announced his retirement from NASA, will serve as senior advisor.

Young was in the second group of astronauts selected by NASA in September, 1962. He was pilot on the first manned Gemini mission in 1965 and command pilot of Gemini 10 in July, 1966. In a lunar-orbit test mission of the lunar module in May, 1969, he served as command module pilot and, more recently, was commander of the Apollo 16 lunar landing mission. He spent more than 20 hours on the lunar surface during three periods of exploration.

John W. Young

A captain in the U.S. Navy and a graduate of the Georgia Institute of Technology, Young has been awarded two NASA Distinguished Service Medals, two NASA Exceptional Service Medals, the Navy Astronaut Wings, two Navy Distinguished Service Medals, three Navy Distinguished Flying Crosses and the 1972 Iven C. Kincheloe Award of the Society of Experimental Test Pilots.

SCHWEICKART TRANSFERRED

Astronaut Russell L. (Rusty) Schweickart, lunar module pilot for Apollo 9, has been transferred from the Johnson Space Center to the staff of the Office of Applications at NASA Headquarters.

Currently assigned to the Office of the Associate Administrator for Applications, he will become Director of User Affairs in August, when Albert T. Christensen, who now holds that position, returns to private industry.

The User Affairs Division in the Office of Applications maintains a close tie with users and potential users of the results of NASA's Applications programs—Earth Observations, Communications, Earth and Ocean Physics, and others —to insure that a flow of information is taking place and that the programs are responsive to user needs.

On the Apollo 9 mission in March, 1969, Schweickart and Astronaut James McDivitt first tested the lunar module in flight.

CHARLESWORTH HONORED

Clifford E. Charlesworth, Manager of the Earth Resources Program at Johnson Space Center, recently was honored by the Mississippi Economic Council as one of 14 outstanding Mississippians.

The Council had compiled a list of several hundred former Mississippians who had distinguished themselves in their work. Out of these, 14 were selected for special recognition at ceremonies held at Jackson, MS, on the occasion of the Council's 25th anniversary.

Charlesworth, one-time resident of Jackson, has been Manager of the Earth Resources Program since April, 1972. In this capacity, he is responsible for managing the planning and direction of all earth resources functions delegated to the JSC by NASA Headquarters.

Prior to his current position, he was Deputy Manager of the Skylab Program and also served as a Flight Director during the Gemini and Apollo programs.

MSFC has asked industry for proposals on two studies related to the Space Tug program, one a study on "Tug Fleet and Ground Operations and Schedules and Controls," the other on "Space Tug Avionics Definition Study."

DR. KRAFT CITES 33 PER CENT ECONOMIC RETURN FROM SPACE

Reviews Wide Assortment of Benefits in Address at His Alma Mater

The economic return from America's space program amounts to some 33 per cent per year, far exceeding the typical yield from investments in stocks, bonds, and real estate, Dr. Christopher C. Kraft, Director of the Johnson Space Center, recently told a Founder's Day audience at his alma mater, the Virginia Polytechnic Institute and State University at Blacksburg, VA.

Dr. Christopher C. Kraft

Explaining that the figure had resulted from a study made by the Midwest Research Institute on the value of dollars invested in space, he added:

"The remarkable 33 per cent return each year is not immediately visible to most people, because the dollars spent in space go to many companies, large and small, all over the nation. They buy inventions—an estimated 30,000 of them by the conclusion of the Apollo program—that serve us in uncountable ways, but inventions that do not have 'product of space research' stamped on them when we see them in action."

Dr. Kraft cited a report in Aviation Week Magazine to the effect that, in the Balance of Trade area, aerospace exports reached a record $5.1 billion last year, enabling the United States to achieve a favorable net balance of $1.7 billion rather than a deficit of $3.4 billion.

Forging the Future

He recalled that 15 years ago, when the space program was taking its first improbable steps, the nation looked beyond the many programs that faced it to take actions necessary to forge the future.

"Our nation agreed to set aside an increasing portion of its resources to expand our horizons —both physical and mental," he said.

"We are the beneficiaries of that investment—an investment by our democracy, not by a single king or queen, and an investment that continues to pay rewards.

"The cost of the journey beyond Earth was great, just as the expense of Columbus' journey to the New World was great. But the benefits already returned to us are even greater.

"It will come as no surprise to scientists studying the Earth, the Moon, the Sun, and the planets that the first 15 years in space were of great benefit. They have advanced their sciences immeasurably.

"But for the average taxpayer, the men and women who made their investment in the 1960s, no scientific knowledge must be analyzed for its usefulness to all mankind and for its cash value to those who have agreed to support it. * * *

"We are all familiar with at least a few of the valuable technological breakthroughs made possible by space investment: fuel cell development, cryogenics, new fireproof materials of several sorts. And most of us have heard about the practical by-products of space invention now in use: improved blood analyzers, medical monitoring systems, hospital cleanroom techniques, electronic controls for the paralyzed, money identifiers for the blind.

"But the final evaluation of the economic return must be made by the economists and other trained specialists, and such evaluations are difficult."

Many People Benefit

After citing the report of the Midwest Research Institute, he said the wide geographic distribution of economic benefits helps to assure that the improvements in the standard of living will benefit many people from many places and in many walks of life.

"The billions spent putting men on the Moon and establishing our competence in space," he continued, "are indeed very large sums—but the profits, measured in the tens of billions, are the legacy of the 1960s to our decade—and today's budgets will provide similar benefits in the 1980s."

Dr. Kraft placed the price of the Earth Resources Technology Satellite launched two years ago at less than 50 cents per average American and asked: "Given its potential for aiding us in the coming years, who would not support a program that costs less than a gallon of gasoline, less than a half-pound of ground beef?"

He called attention to the benefits of Skylab and of weather and communications satellites, reported that NASA this year launched more space-

craft for other organizations than it did for itself, and referred to the Apollo-Soyuz Test Project to be carried out next year by Russia and the United States.

"Apart from the international cooperation fostered by this project," he revealed, "both nations are reaping substantial benefits from exchanges of scientific knowledge in many areas. The Apollo-Soyuz project may come to symbolize the new flavor of space exploration—a task to be undertaken not by Americans or Russians or Europeans, but by the people of the Earth."

Shuttle a Good Investment

Referring to the Space Shuttle, Dr. Kraft predicted that it was an investment—an estimated annual cost equal to about $5 for each American —that will pay, perhaps, the greatest return to future generations.

"For those of us who dream of a future in which man journeys first to the planets and then to the stars," he added, "the Shuttle seems but a stepping stone. With such a transportation system, we can—if we should choose—build permament space stations and launch planetary vehicles and eventually starships from an orbit far above the Earth.

"But in terms of immediate applications to life here on Earth, the Shuttle will be unmatched in its capabilities. With it we may launch a variety of scientific devices to study Earth phenomena. We may carry teams of international specialists, too—a program made possible not by our tax dollars alone, but by the cooperation of Europeans who will build a Spacelab module to fly in the Shuttle's multi-purpose hold. Through the European Space Agency, hundreds of millions of dollars will be spent in a program that unites many nations for the benefit of all.

"Who can say what rewards our investment this year will bring to the Earth? As our resolve reawakens, we can commit ourselves again to the extensive research and development programs necessary for the advancement of all mankind.

"Perhaps the Space Shuttle will carry tons of equipment into orbit to collect solar energy to supply our Earth in the coming decades—the decision to invest or to refrain from investing in such a program is a decision that must be made by all Americans. Such decisions will determine the course of our future, not merely our sucess as a nation, but perhaps our ultimate survival as a species."

JUDITH COLE JOINS NASA

Judith Ann Cole, Staff Assistant in the Office of the Director of the U.S. Arms Control and Disarmament Agency, has been appointed Deputy Assistant Administrator for Legislative Affairs, succeeding Gerald J. Mossinghoff, recently named Assistant General Counsel.

Judith Ann Cole

A native of Kansas, Ms. Cole also served as Special Assistant to the Director for the General Advisory Committee on Arms Control and Disarmament Affairs (ACDA).

Graduated with a BA degree in Sociology from St. Mary's College in 1961, she received an MA degree in Political Science from the University of Missouri. After teaching school in Indiana and Maryland, she served as Legislative Assistant to Congressman Robert Ellsworth and later to Congressman Philip Ruppe.

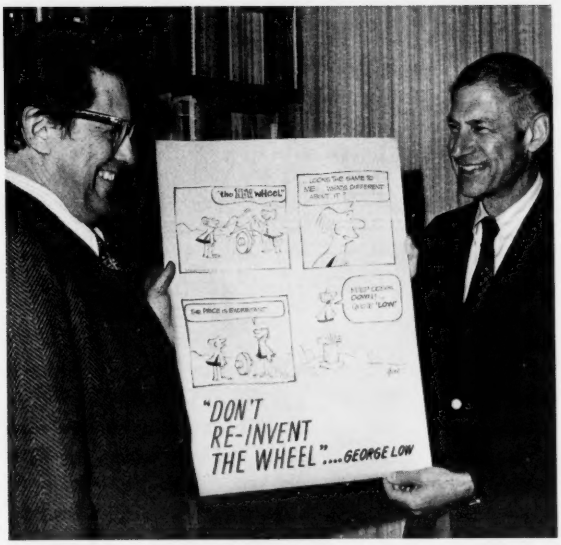
In late 1967, she joined the Nixon Campaign Committee as Chief Administrative Officer of the Washington, DC, National Headquarters and served in congressional relations during the transition government of the President-elect in 1968. Prior to joining ACDA, she served in the White House as Staff Assistant to the President, assisting in the recruitment of women candidates for Presidential appointments.

KILGORE PROMOTED AGAIN

Edwin C. Kilgore, who last fall was named Acting Associate Administrator for Aeronautics and Space Technology, on May 20 was appointed Deputy Associate Administrator for Center Operations.

Since the NASA Headquarters reorganization on March 15, he had been assisting Dr. George M. Low, Acting Associate Administrator for Center Operations, in organizing and managing the new Office of Center Operations.

In August, 1970, Kilgore was transferred to Headquarters and made Deputy Associate Administrator (Management), OAST. He formerly had been at Langley Research Center, where his last assignment was that of Deputy Chief of the Office of Engineering and Technical Service.



BEARING DOWN ON COSTS—Dr. George M. Low, NASA Deputy Administrator, right, and Adelbert O. Tischler, Special Assistant to the Assistant Administrator for Industry Affairs and Technology Utilization, show the first of a series of "Quote Low" cartoons by Johnny Hart designed to promote the Low Cost Systems Program throughout NASA. Purpose of the program is to standardize commonly used spacecraft components and to find efficient, cost-saving management techniques to carry out the mission more effectively. Cartoonist Hart is donating his services for the series.

CASANI HEADS DIVISION

John R. Casani, Spacecraft System Manager for the Mariner 10 Venus-Mercury Project, has been named Manager of the Jet Propulsion Laboratory's Guidance and Control Division, succeeding Garth E. Sweetnam, who died in March.

A native of Philadelphia, Casani was graduated from the University of Pennsylvania as an electrical engineer in 1955. He joined JPL the following year, participating in missile guidance development and space probe instrumentation and system design.

For more than a decade, Casani, who holds a NASA Exceptional Service Medal, has been associated with the design and development of spacecraft that explored Mars, Venus and Mercury. His assignments included those of Project Engineer and Spacecraft System Manager for Mariner 4; Deputy Spacecraft System Manager, Spacecraft System Manager and Acting Project Manager for Mariner 6 and Mariner 7; and Spacecraft System Manager for Mariner 10.

DR. SCHMITT IS APPOINTED TO HEAD ENERGY PROGRAMS

Named Assistant Administrator Following 90-Day Transfer to Headquarters

Dr. Harrison H. Schmitt, lunar module pilot on Apollo 17 and Chief of the Science and Applications Directorate of the Astronaut Office at Johnson Space Center, has been appointed Assistant Administrator for Energy Programs, effective May 13.

As announced in the February issue of NASA ACTIVITIES, he had been transferred from JSC to Headquarters for a 90-day period to serve as Special Assistant to the Administrator to coordinate efforts of the space agency in energy research and development.

In announcing his latest appointment, Dr. James C. Fletcher, NASA Administrator, said: "This new office of Energy Programs will allow NASA to support the Federal agencies responsible for energy research and development more effectively, which, in turn, will ensure the application of NASA-developed technology to the critical energy problems facing our nation today."

The office Dr. Schmitt will head consolidates energy-related functions previously performed by several other NASA Headquarters offices, particularly the Office of Applications and the Office of Aeronautics and Space Technology.

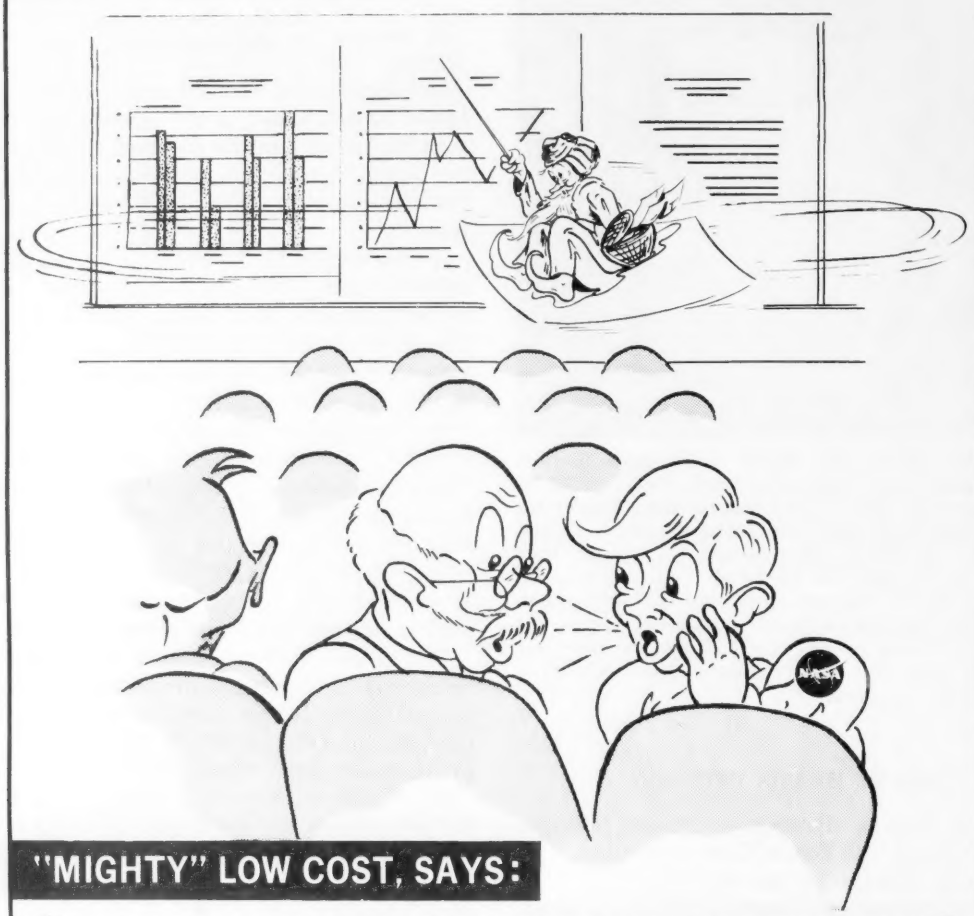
Dr. Fletcher also revealed that, in addition to his new duties as Assistant Administrator, Dr. Schmitt will continue to assume his responsibilities at JSC until they are completed and a replacement named.

HAYNES JOINS NASA

James R. Haynes, a District of Columbia attorney, has been appointed Special Assistant to the Assistant Administrator for International Affairs and will assist in the area of special projects and policy development.

Formerly Deputy Counsel for the Federal Energy Office, he is a native of Louisville, KY, and holds business administration, economics and law degrees, respectively, from Fisk University, the University of Michigan and George Washington University. A resident of Washington, DC, for 12 years, he has been active with various civic and community self-help organizations, particularly in the field of housing and economic development.

LOW COST CORNER



"MIGHTY" LOW COST, SAYS:

"SAY.... IS THIS REVIEW REALLY NECESSARY?"

To reduce the cost of your meetings consider the following:

- Hold only necessary meetings
- Limit the attendance
- Make sure objectives are well understood
- Prepare a good agenda and stick to it
- Trade off use of tele-conferences and facsimile equipment
- Distribute action items immediately
- Trim the minutes distribution list

SPACE AND URBAN PROBLEMS—Mayor William D. Schaefer of Baltimore, MD, left, and Dr. John F. Clark, Director of the Goddard Space Flight Center, are shown as they recently signed an agreement to test the feasibility and measure the effects of using space technology in the solutions of problems affecting urban environment. Thomas S. Golden, Senior Engineer at Goddard, has been assigned to work directly with the Mayor's office in connection with the two-year project.

CABLE TECHNOLOGY SHOWN

A practical demonstration of Flat Conductor Cable (FCC) technology was held May 21 at the Marshall Space Flight Center.

Attending the demonstration, in which FCC had been installed to replace conventional round wiring in a conference room, were representatives from the Department of Housing and Urban Development, General Services Administration, Federal Housing Authority, NASA Headquarters, Urban Development Corporation of New York, and electrical contractors.

Flat Conductor Cables are especially effective in modular concepts of building and in the rehabilitation of old dwellings which need new wiring.

Methods originally developed to analyze images of the Earth from space have been adapted to enable doctors to see details on an X-ray that they could not normally make out with their own eyes.

The adaptation was done by Bob Butterfield, a NASA cooperative student, during his work period at the Data Analysis Facility operated by KSC's Earth Resources Office.

A series of rocket launchings conducted last year at the White Sands Missile Range is now helping scientists study the Sun with data returned from Skylab.

The Apollo Telescope Mount Calibration Rocket (CALROC) flights, with project engineers from Marshall and Goddard Space Flight Centers, consisted of six Black Brant sounding rocket launches performed while Skylab was manned. Each of the rockets contained a small payload designed to measure and record solar phenomenon simultaneous with Skylab observations.

American and German space scientists and engineers met at JPL during May to plan the flight of the HELIOS solar probe spacecraft, the first, HELIOS-A, scheduled for a mid-October launch.

Their agenda dealt with mission operations to be conducted from JPL during the first month of the mission. The remaining 17 months of planned active spacecraft operation will be controlled from West Germany.

CONGRESSMAN VISITS FRC—The Hon. William M. Ketchum (center), Republican Congressman from California's 36th District and member of the House Committee on Science and Astronautics, visited the Flight Research Center during May. With him were his wife (second from left) and Ms. Euna Maples, a member of his staff. The group was briefed on FRC activities by Center Director Lee Scherer (left) and by Research Pilot John Manke (right).

WEATHER BALLOON PROGRAM

More than 500 weather balloons soared high above two-thirds of the nation the second week in May in a program conducted by NASA to provide "ground truth" data for checking out information provided by weather satellites.

The program is managed for the Office of Applications by the Marshall Space Flight Center. It is called Atmospheric Variability Experiment-II (AVE-II) and is managed by Robert E. Turner of MSFC.

Balloons were released from 55 stations by the National Weather Service; the National Severe Storms Laboratory in Oklahoma; NASA, including the Marshall Center and the Wallops Flight Center in Virginia; and from Eglin Air Force Base in Florida.

Flying as high as 30 kilometers (about 100,000 feet), each balloon measured the atmosphere for pressure, temperature, humidity, and wind speed and direction on its ascending flight. Data was telemetered back to the ground stations.

Turner said that each station released the balloons at three-hour intervals. The stations normally release weather balloons at 13-hour intervals.

U.S./USSR SEA STUDIES

Scientists from the United States and the Soviet Union, participating in a joint symposium on the Bering Sea, have found that satellite data can be used for accurate assessment of sea surface and related atmospheric conditions.

The symposium was held in Leningrad May 12-17 to report final results from the joint U.S./USSR Bering Sea Experiment on Microwave Sensing of Atmospheric and Oceanographic Characteristics.

Research aircraft provided by NASA and the Soviet Academy of Sciences obtained data for the study during February and March, 1973, working with a U.S. ice breaker and a Soviet oceanographic research ship to study Bering Sea ice cover, surface state, and zones of precipitation.

Two research groups independently surveyed the sea surface under identical atmospheric conditions, using microwave radiometry techniques, with comparison data provided by the research ships sailing below. The findings of the two teams were in general agreement, permitting a high degree of confidence in the data collected and in the subsequent interpretation.

The study offered convincing proof that scientists can use microwave measurements from satellites to assess sea ice distribution, motion, and stress, and that multi-spectral observations can permit scientists to determine the content of liquid water and water vapor in the atmosphere above the sea surface.

U.S. and Soviet space crews are planning to use ATS-F, an advanced communications satellite, as a main communication link with Earth during the joint Apollo-Soyuz flight set for July, 1975. It will be the first use of a satellite to relay television and other communications from spacecraft to Earth stations.

STORING SKYLAB MATERIALS

About 300 items of Skylab materials returned from orbit will be stored in a repository at the Marshall Space Flight Center.

A room has been modified for this purpose for security and fire protection. Also, temperature and humidity controls have been added to accommodate long-term storage requirements of the materials.

FRC VISITOR—Astronaut Mike Collins (left), command module pilot for the first lunar flight and now Director of the National Air and Space Museum of the Smithsonian Institution, is pictured with John Manke, Flight Research Center test pilot, after they recently made several simulated Space Shuttle landings in the F-104 shown in the background. Collins visited the Center as part of a tour of USAF Reserve general officers.

MEDICAL KNOW-HOW TRADE

Ames Research Center has signed an agreement with the Oakland-based Children's Hospital Medical Center of Northern California for reciprocal use of personnel, equipment, and facilities to aid in medical research.

Under the agreement, provision is made for medical teams from the hospital and researchers at ARC to exchange knowledge and equipment for mutual benefit. Areas of possible study include human physiology, endocrinology, neurology, medical monitoring techniques and controlled environments.

As a result of the agreement, two projects already are underway. One is an attempt to unravel the physical structure of a particular enzyme involved in the formation of fatty materials in animals (with the aid of electron microscopy). The other proposes to isolate a factor in blood serum which appears to be effective in reducing cardiac output.

HELPING RIF VICTIMS

A vigorous program of outplacement assistance was launched at the Marshall Space Flight Center to help locate future employment and provide job counseling assistance for 397 employees affected by the recent reduction-in-force there.

Personnel from the Center's various organizational offices contacted representatives from industry, business and government. Job openings were transposed into a NASA employment code to match the affected employees' speciality codes. When matches were identified, MSFC sent reproductions of the employees' resumes to the outlying employer and helped arrange for an employee/employer interview.

The outplacement assistance program also included several workshops, training sessions, and counseling activities designed to help ease the problems that employees face when they are confronted with outplacement.

CERNAN CENTER OPENED

Astronaut Eugene A. Cernan was present at the dedication on May 23 of the Eugene A. Cernan Space Center at Triton College in his home town of River Grove, IL. A statue of him wearing a space suit stands just outside the main entrance to the building.

A captain in the U.S. Navy, Cernan was commander of the Apollo 17 crew. Earlier, he occupied the pilot seat on the Gemini 9 mission, a three-day flight during which he spent two hours and 10 minutes outside the spacecraft in extravehicular activity, becoming the first person to stay outside a space ship for a full revolution of the Earth.

He subsequently served as backup pilot for Gemini 12 and as backup lunar module pilot for Apollo 7. He was lunar module pilot on Apollo 10 in 1969, the first comprehensive lunar-orbital qualification and verification flight test of an Apollo lunar module, and backup spacecraft commander for the Apollo 14 flight.

SPACE PROCESSING SYMPOSIUM

Internationally recognized scientists representing universities, research institutes, industry and government gathered at Marshall Space Flight Center April 30 and May 1 for the third Space Processing Symposium. Theme for the two-day meeting was "Skylab Results." Papers also were presented on future space processing concepts.

May 15, 1974

National Aeronautics and Space Administration

ENERGY CONSERVATION PERFORMANCE REPORT

Fiscal Year 1974

Third Quarter (January, February, and March 1974)

		Use During 3rd Quarter FY 1973	Adjusted Base 1/	Use During 3rd Quarter FY 1974	Percent Reduction
BUILDINGS AND FACILITIES OPERATIONS					
Electricity	KWH X 10^3	477,945	512,628	324,281	
	BTU X 10^9 2/	5,544	5,946	3,762	37
Fuel Oil	GAL X 10^3	4,667	4,383	4,139	
	BTU X 10^9	630	614	514	16
Natural Gas	CU FT X 10^3	1,615,206	1,706,451	1,083,925	
	BTU X 10^9	1,665	1,759	1,118	36
LPG or Propane	GAL X 10^3	---	---	---	
	BTU X 10^9	---	---	---	--
Coal	TONS	---	---	---	
	BTU X 10^9	---	---	---	--
Other	BTU X 10^9	359	459	645	+41
Total, BUILDINGS AND FACILITIES OPERATIONS	BTU X 10^9	8,199	8,779	6,039	31
VEHICLES AND EQUIPMENT OPERATIONS					
Gasoline	GAL X 10^3	357	449	334	
	BTU X 10^9	45	56	42	26
Diesel and Petroleum Distillate Fuel	GAL X 10^3	61	62	48	
	BTU X 10^9	8	9	7	23
Aviation Fuels					
Aviation Gasoline	GAL X 10^3	335	380	278	
	BTU X 10^9	42	48	35	27
Jet Fuel	GAL X 10^3	2,240	2,890	1,702	
	BTU X 10^9	285	368	224	39
Total, VEHICLES AND EQUIPMENT OPERATIONS	BTU X 10^9	380	480	307	36
GRAND TOTAL	BTU X 10^9	8,579	9,258	6,346	31

FOOTNOTES:

1/ Actual FY 1973 use adjusted for program changes.

2/ 11,600 BTU/KWH.

3/ Does not include GSA vehicles. Does include all gasoline usage.

ACCENT ON CAREERS—More than 200 high school seniors from 13 schools along the Gulf Coast recently visited the Mississippi Test Facility in conjunction with Federal Career Day, an annual event sponsored by the Mississippi Coast Association of Federal Administrators to provide students with an insight into their chosen career fields and to encourage them to seek employment with the Federal Government. In this photo, Dr. R. H. Boudreau (center) of the Earth Resources Laboratory at MTF is shown with some of the group.

TESTING AIRCRAFT WAKES

An experimental Scanning Laser Doppler System (SLDS), originally designed by the Marshall Space Flight Center to measure atmospheric winds and turbulence, is now being tested to determine the system's reliability in detecting and monitoring aircraft wake vortices.

Aerospace scientists know that an aircraft in flight leaves in its wake a sheet of disturbed air, which within a few span lengths rolls up into a pair of horizontal, tornado-like vortices can exert powerful forces on other aircraft, creating a hazard if sufficient separation is not provided.

The MSFC tests, using lasers to detect these vortices, are a part of an overall research effort concerning vortex detection being conducted jointly by the Federal Aviation Agency (FAA) and NASA.

Flyby tests involving the use of the SLDS were conducted by Marshall Center and FAA officials recently at a test site setup at the western end of Redstone Arsenal near MSFC. These tests used a FAA-supplied Boeing 720 aircraft and two laser Doppler systems recently upgraded and modified to meet vortex detection requirements.

Early results from the field tests indicate that, in addition to detecting the vortices, the SLDS provided substantial data concerning the air speeds within them. Detailed data analysis concerning these results is now in progress at MSFC.

KEY AWARDS

Astronaut Joseph P. Kerwin, Science Pilot on the first Skylab mission and the first medical doctor to enter space, was presented the Founders Medal of Grant Hospital at its annual Award Dinner in Chicago May 28.

The award is presented to an individual who has made "a major contribution in a field of interest or endeavor which forwards the progress of medicine in any of its aspects or has direct bearing in health improvement." Dr. Kerwin was selected as a recipient by a committee from the medical staff of the hospital.

Grant Hospital was founded in 1883 and for the last half century has maintained one of the largest charity clinics in the city. Located in Chicago's mid-north area, it serves both the Gold Coast and the Spanish-speaking and Black ghettos.

Gerald P. Carr, commander of Skylab 3, recently was presented the Distinguished Eagle Scout Award of the National Council of Boy Scouts of America by the Orange County Council at its annual dinner at Anaheim, CA. One of Scouting's highest awards, it is presented "to persons of noteworthy achievement who have been Eagle Scouts for more than 25 years."

More than 120 scientists and engineers from industry, government and universities met in an Outer Planet Probe Technology Workshop held at Ames Research Center May 21-23. One subject under discussion was the matter of plunging directly into the atmosphere of planets like Jupiter, Saturn, and Uranus.

CRASHWORTHINESS PROGRAM—General aviation aircraft are crashed at Langley Research Center to study the effects of crash situations on structures of airplanes. In cooperation with the Federal Aviation Administration and the general aviation industry, they are swung pendulum-like into the ground at varying speeds and altitudes. The mannequin silhouetted in the window is used to determine crash effects on humans.

SEPTEMBER ASTP MEETING

A meeting of Apollo-Soyuz Test Project (ASTP) specialists from the USSR and NASA, held at Johnson Space Center during late April and early May, will be followed in September by a similar gathering in Moscow.

The JPL meeting was arranged to continue technical discussions and planning for the joint flight of Apollo and Soyuz spacecraft to test compatible systems for rendezvous and docking. Those who took part in the discussions included the project technical directors, prime flight crews, and the five working groups assigned to mission planning, control and guidance, mechanical design, communications and tracking, life support and crew transfer.

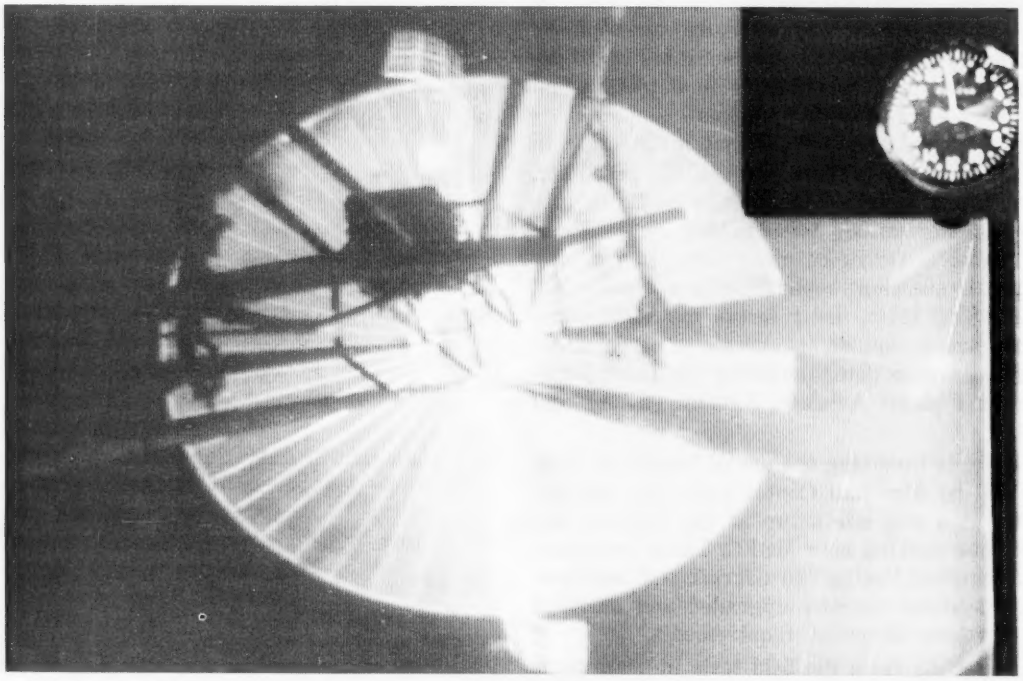
Joint flight crew training will be conducted in the USSR from June 24 to July 15 of this year and in the United States from Sept. 9-30.

To familiarize themselves with the flight spacecraft and to conduct tests of compatible equipment, specialists and flight crew members will visit the launch site in this country in February, 1975, and that in the USSR the following May.

The papers of the late Dr. Hugh L. Dryden, Deputy Administrator of NASA from its creation until his death in 1965, were opened to the public at ceremonies held at Johns Hopkins University at Baltimore, MD, May 15. The principal speaker for the occasion was Robert C. Seamans, Jr., former Deputy Administrator of NASA and now President of the National Academy of Engineering.

Playalinda Beach at Kennedy Space Center has resumed its popularity as a public bathing and fishing spot since it was reopened following the removal of the Skylab Rescue Vehicle from Complex 39's Pad B earlier this year.

A ground station designed by NASA to receive high-resolution weather photos directly from orbiting satellites left Goddard Space Flight Center May 17 for Dakar, Senegal, where it will play a key role in an international study of tropical weather patterns.



READY FOR BUSINESS—The nine-meter (30-foot) deployable antenna carried by the recently-launched Applications Technology Satellite-6 (ATS-6) is shown in this photograph taken by an on-board TV camera to be fully extended. The view indicates the lightweight mesh antenna is in good condition for the telecommunications experiments to be conducted with it. The spacecraft's two solar panels can be seen projecting from behind the top and bottom of the antenna.

LUNAR SAMPLE EXHIBITS

The following is a schedule of lunar sample exhibits from June 15 to July 15:

CALIFORNIA—Naval Air Rework Facility Family Day, Admiral Stroop Field, U.S. Naval Air Station, North Island, San Diego, June 30; Orange County Fair Association, Fair Drive, Costa Mesa, July 12-21.

ILLINOIS—Bloomington Festival, Bloomington Boys Club, Bloomington, July 4-7.

OHIO—Bellevue Cherry Festival, City Hall, Bellevue, June 28-30; Armstrong Air and Space Museum, Wapakoneta, July 8-Aug. 12.

PENNSYLVANIA—Scottsdale Centennial Program, 10 Mount Pleasant Road, Scottsdale, June 7-16.

TEXAS—Cherokee Independence Days Festival, Cherokee County Courthouse, 100 E. Fifth Street, Rusk, June 27-July 3; Fort Worth Museum of Science and History, 1501 Montgomery Street, Fort Worth, May 25-July 1.

CANADA—Moose Jaw, Bushell Park, Saskatchewan, June 23-July 2; Calgary Canadian Exhibition, Kinsmen Center, Flare Square Site, Alberta, July 4-13.

Permanent Displays

ALABAMA—Alabama Space & Rocket Center, Marshall Space Flight Center, Huntsville.

FLORIDA—Visitor Information Center, Kennedy Space Center.

KANSAS—Eisenhower Library, 200 S.E. 4th Street, Abilene.

NEW YORK—United Nations Building, New York City.

OHIO—U.S.A.F. Museum, Wright Patterson Air Force Base.

TEXAS—Johnson Library, University of Texas, Austin; Visitor Information Center, Johnson Space Center, Houston.

VIRGINIA—Visitor Information Center, Langley Research Center, Hampton.

WASHINGTON, DC—National Geographic Museum; Smithsonian Institution, National Air and Space Museum, 1000 Jefferson Drive.

FILM ACTIVITY

The NASA film, "Mars—The Search Begins," has been awarded a Blue Ribbon Trophy for first place in the science division category at the 16th Annual American Film Festival in New York City. This is the second successive year that a NASA film has been honored with this award.

"Mars—The Search Begins" was selected for showing at the Whitney Museum of American Art in New York for a period of 10 days beginning May 30.

Film Release Announcement: "Hurricane Below" is the first of a series of NASA films on disaster phenomenon (created by nature or by man), and NASA's contribution of providing data to reduce casualties and property loss through observations from space. The film tells how a hurricane is formed and graphically displays the devastating events and destruction of one of nature's feared phenomena. Additional films in the "Rediscovery" series, to be produced during the next 12 months, will be on the subjects of tornadoes, pollution, earthquakes, and floods. "Hurricane Below" and each of the films to be produced in the series will be approximately 15 minutes in duration.

RADIO-TELEVISION

(Released Nationally)
JUNE

TELEVISION—A color film release, the *Aeronautics and Space Report*, "Random Dec—Using NASA Computers and Wind Tunnel Sensors to Study Bridge Stress." (Ames story.)

RADIO—Four weekly *Space Story* programs are to have been released: "Remotely Piloted Research Vehicle," (FRC/Garry Layton); "Shuttle Passenger Studies," (Hqs/Dr. David Winter); "Viking to Mars," (JPL/Henry Norris); and "Shuttle Launch Preparations," (KSC/Gene McCoy).

HEADQUARTERS PRESS RELEASES

(Issued by the Public Information Division, Code FP, Headquarters, Washington, DC 20456. These releases are available only to members of the news media.)

74–114 Young to Head Astronaut Office
74–115 SMS–A Briefing Set for 10 a.m. May 8
74–116 Aeronautics Update
74–117 NASA Research May Lead to Safer Auto Brakes, Plane Tires
74–118 Dr. Winter named New Life Sciences Director
74–119 Madrid 210 Antenna Dedication Set
74–120 Johns Hopkins Ceremony to Open Dryden Papers to Public
74–121 Mariner 10 Maneuvers to Return for Second Look at Mercury
74–122 Doppler Scanning System List w/Aircraft Wakes
74–123 Yardley Named New Head of Manned Space Flight
74–124 Astronaut Schmitt Heads New NASA Energy Office
74–125 ATS–F Press Briefing May 23
74–126 Satellite to Relay TV from Apollo Soyuz
74–127 Two-Nation Helios Working Group Meets in Pasadena
74–128 Judith Cole Named to Legislative Affairs Post
74–129 NASA Weather Photo Device to Aid African Nations
74–130 Space Shuttle Rocket Motor Contract Extended
74–131 NASA Sensors Aid in Cerebral Palsy Research
74–132 IBM Named for Space Shuttle Software Negotiations
74–133 NASA Administrator Cites Equal Employment Advances
74–134 NASA Workshop Will Study Outer Planet Probes
74–135 Press Briefing Space Transportation System
74–136 NASA Audio News Service Goes on a Daily Basis
74–137 Kilgore Named Deputy in Center Operations Post
74–138 NASA to Launch Hawkeye Satellite (Press Kit)
74–139 U.S., Soviets Use Satellites for Sea Studies
74–140 Haynes Named to International Affairs Post
74–141 NASA Selects Firms for Telemetry on-Line Processing System
74–142 Italy to Build Earth Resources Ground Station
74–143 Talladega College Awarded NASA Grant
74–144 Alcorn A & M Receives NASA Grant

PATENTS AND INVENTIONS RESULTING FROM NASA RESEARCH

(The Office of General Counsel, NASA Headquarters, announces that the following U.S. patents have been issued by the U.S. Patent Office to NASA for inventions resulting from NASA research. Inquiries concerning them should be directed to the attention of the NASA Patent Counsel for the indicated installation.)

Inventor(s) and Employer	*Title and NASA Docket*	*Patent No.*	*Installation*
John B. Sainsbury-Carter, Sikorsky Aircraft, Stratford, CT	Bonded Joint and Method (LAR–10, 900–1)	3,809,601	LaRC
Carl V. Rumble and Kendall L. Driscoll, Modern Machine & Tool Co., Newport News, VA	Means for Accommodating Large Overstrain in Lead Wires (LAR–10, 168–1)	3,809,800	LaRC
William L. Kraushaar, University of Wisconsin, Madison, WI	Coaxial Anode Wire for Gas Radiation Counters (GSC–11, 492–1)	3,812,358	GSFC
Chung Kim, Donald Gorelick and Wayne Chen, all of George Washington University, Washington, DC	Arterial Pulse Wave Pressure Transducer (GSC–11, 531–1)	3,811,429	GSFC
Gerald D. Oliver, Caltech/JPL, Pasadena, CA	Scanning Nozzle Plating System (NPO–11, 758–1)	3,810,829	NaPO
William J. Abernathy and Lowell G. Snoddy, NASA/MSFC	Insert Facing Tool (MFS–21, 485–1)	3,813,183	MSFC
Joseph P. Valinsky, McDonnell Douglas Corp., Huntington Beach, CA	Device for Monitoring a Change in Mass in Varying Gravimetric Environments (MFS–21, 556–1)	3,812,924	MSFC
Dan H. Dane, NASA/MSFC	Sprag Solenoid Brake (MFS–21, 846–1)	3,812,936	MSFC
Wayne H. Howard, Donald R. Young and Richard R. Adachi, NASA/ARC	Programmable Physiological Infusion (ARC–10, 447–1)	3,809,871	ARC
Rudolf A. Schindler, Caltech/JPL, Pasadena, CA	Single Reflector Interference Spectrometer and Drive System Therefor (NPO–11, 932–1, and 13,127–1)	3,809,481	NaPO
Thomas G. Meador, Jr., NASA/LaRC	Light Shield and Cooling Apparatus (LAR–10, 089–1)	3,811,044	LaRC
Robert D. Lee, NASA/ARC	Bio-Isolated DC Operational Amplifier (ARC–10, 596–1)	3,811,094	ARC

1974 LAUNCH SCHEDULE

Name	*Launch Date*	*Vehicle*	*Range*	*Mission/Remarks*	
Skynet II–A (UK)	Jan. 18	Delta	ETR	Reimbursable launch. United Kingdom's communications satellite.	Launched Vehicle failure
Centaur Proof Flight	Feb. 11	Titan III–E Centaur	ETR	Test flight of booster planned for Viking Mars launch in 1975.	Launched Engine failure
San Marco (SM–C2)	Feb. 18	Scout	SM	United States/Italy cooperative mission to conduct air density measurements.	Launched
UK X–4	Mar. 8	Scout	WTR	Reimbursable launch. United Kingdom technology satellite with experiments related to spacecraft power systems, attitude control and stabilization.	Launched Successful
WESTAR–A	April 11	Delta	ETR	Western Union communications satellite. Reimbursable launch.	Launched
SMS–A	May 16	Delta	ETR	First prototype/developmental mission for geostationary meteorological operational satellite system; day and night continuous imaging of cloud cover; sophisticated remote-platform data-collection-and-weather data relay.	Launched
ATS–6	May 30	Titan III–C	ETR	Developmental and demonstrative communications mission using technology applicable to terrestrial and space needs; utilizes 9.15-meter (30-foot) deployable parabolic antenna and communications system with frequencies in several bands; will support public communications experiments in the U.S. and India.	Launched

1974 LAUNCH SCHEDULE—Cont.

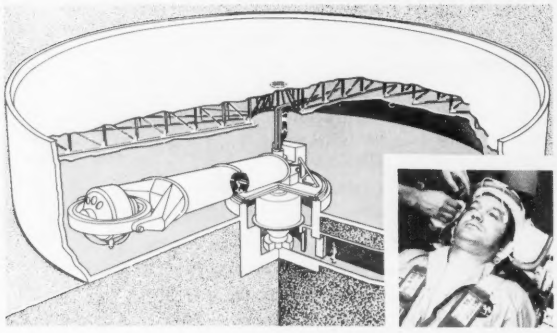
Name	*Launch Date*	*Vehicle*	*Range*	*Mission/Remarks*
Hawkeye (formerly Injun-F)	June	Scout	WTR	To study the topology of the magnetic field at large radial distance over the Earth's dgear caps and the interaction of the solar winds with the geomagnetic field.
WESTAR–B	June	Delta	ETR	Western Union communications satellite. Reimbursable launch.
SMS–B	July	Delta	ETR	Second prototype/developmental mission for geostationary meteorological operational satellite system; same as SMS–A; SMS–A and SMS–B will support GARP Atlantic Tropical Experiment (GATE).
Intelsat IV F–8 ..	July	A–Centaur ..	ETR	One of a series of communications satellites to form part of a global communication commercial satellite system. Launch for COMSAT.
AEROS–B (German)	July	Scout	WTR	Spin-stabilized, Earth-orbiting satellite designed for upper atmosphere measurements.
Netherlands Sat.–A (ANS–A)	August ..	Scout	WTR	Designed to obtain data from celestial X-ray and ultraviolet sources.
GOES–A (SMS–C)	August ..	Delta	ETR	First Geostationary Operational Environmental Satellite, follow-on to SMS missions, funded by NOAA.
UK–5	August ..	.....	.....	To investigate galactic and extra galactic X-ray sources.
Helios–A	2nd Half	Titan III	ETR	To investigate the properties of and processes in interplanetary space in the direction of and close to the Sun by developing, launching and operating automated spacecraft.
Skynet II–B (UK)	3rd Qtr. ..	Delta	ETR	Reimbursable launch. United Kingdom communications satellite.
WESTAR–C	October ..	Delta	ETR	Western Union communications satellite. Reimbursable launch.
Nimbus F	October	Delta	WTR	Meteorological research and development mission to test instruments for expanding atmospheric remote sensing to cloud regions, extend observations to new spectral regions, extend sounding capabilities to higher altitudes, demonstrate feasibility for improvements to operational systems, and support GATE.
Comsat–A	4th Qtr. ..	Delta	ETR	First of two maritime communications satellites to be situated over Atlantic and Pacific Oceans.
Symphonie–A (French/German)	4th Qtr. ..	Delta	ETR	Experimental communications satellite. Reimbursable.
Intelsat IV F–1 ..	(Under Study)	.....	.....	One of a series of communications satellites to form part of a global communication commercial satellite system. Launch for COMSAT.
Intelsat IV F–6 ..	(Under Study)	.....	.....	One of a series of communications satellites to form part of a global communications commercial satellite system. Launch for COMSAT.
ITOS–G	(Under Study)	Delta	WTR	Polar-orbiting operational meteorological satellite funded by NOAA; day and night cloud cover and temperature sounding.
GEOS–C	(Under Study)	Delta	WTR	Geodynamic Experimental Ocean Satellite to demonstrate feasibility of satellite-altimeter techniques for measuring the topography of the ocean surface; can be significant contribution to understanding of ocean dynamics.

ARE YOU GETTING YOUR

WORTH FROM SPACE?

FOR A PENNY OF YOUR TAX DOLLAR, YOU ARE GETTING ...

TECHNOLOGY TO AID CEREBRAL PALSY CHILDREN



Sensors used on the huge centrifuges in exercise tests related to studies for space flight, such as that at left, are now employed in the treatment of children with cerebral palsy.

This transfer of space technology to public use originated with Ms. Fran Ford, a Physical Therapist at Children's Hospital at Stanford University in California, pictured at right fastening a sensor to one of her patients. She was having trouble acquiring precise measurements of walking patterns of youngsters suffering with cerebral palsy, an important step in applying proper treatment. Under old methods, children were directly cabled into the machinery. Wires trailing across floors caused problems, and the young patients complained because their skin had to be "sanded" to redness to improve the signal pickup.

A Tech Brief on electrodes led her to get in touch with Sal A. Rositano, Ames Research Engineer, who recognized her problems as similar to those experienced by NASA in conducting space tests. If the tiny electric currents could be pre-amplified at the electrode site, he realized, the wire motion-induced signals would not affect the telemetry circuits.

A call went out to Edward P. Luzzi, of L-M Electronics at Dale City, CA, who had developed for NASA several sophisticated telemetry systems used in blood flow monitoring. He was in the process of building for the space agency a small postage-stamp-sized amplifier. Three of these were supplied Ms. Ford.

She reported immediate success. No special skin preparation was needed, wire noise was gone, and error-free measurements of walking patterns were recorded. She hopes to have the equipment so simplified that untrained therapists can use it anywhere, without having to send children to medical centers away from their homes.

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